

# SEQUENCE LISTING

<110> Johal, Gurmukh S  
Multani, Dilbag S

<120> ISOLATED NUCLEIC ACID MOLECULES ENCODING THE DW3  
P-GLYCOPROTEIN OF SORGHUM AND METHODS OF MODIFYING  
GROWTH IN TRANSGENIC PLANTS THEREWITH

<130> 035718/275581

<140>

<141>

<150> 60/165,176

<151> 1999-11-12

<150> 09/711,619

<151> 2000-11-13

<160> 9

<170> PatentIn Ver. 2.1

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<212> DNA

<213> Sorghum bicolor

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 <212> DNA  
 <213> Sorghum bicolor

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Met Phe Met Lys Gly Phe Ser Gly Asp Leu Glu Ala Ala His Ala Arg

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gcg ttc aac gcg gag cgc aag atc acg ggg ctg ttc gag gcc aac ctg				192
Ala Phe Asn Ala Glu Arg Lys Ile Thr Gly Leu Phe Glu Ala Asn Leu				
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cgc ggc ccg ctc cgg cgc tgc ttc tgg aag ggg cag atc gcc ggc agc				240
Arg Gly Pro Leu Arg Arg Cys Phe Trp Lys Gly Gln Ile Ala Gly Ser				
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ggc tac ggc gtg gcg cag ttc ctg ctg tac gcg tcc tac gcg ctg ggg				288
Gly Tyr Gly Val Ala Gln Phe Leu Leu Tyr Ala Ser Tyr Ala Leu Gly				
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ctg tgg tac gcg gcg tgg ctg gtg aag cac ggc gtg tcc gac ttc tcg				336
Leu Trp Tyr Ala Ala Trp Leu Val Lys His Gly Val Ser Asp Phe Ser				
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Arg Thr Ile Arg Val Phe Met Val Leu Met Val Ser Ala Asn Gly Ala				
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Ala Glu Thr Leu Thr Leu Ala Ala Pro Asp Phe Val Lys Gly Gly Arg Ala				
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Met Arg Ser Val Phe Glu Thr Ile Asp Arg Lys Thr Glu Val Glu Pro				
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Asp Asp Val Asp Ala Ala Pro Val Pro Glu Arg Pro Lys Gly Glu Val				
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Ala Tyr Gly Arg Glu Gly Ala Thr Glu Ala Glu Val Val Glu Ala Ala	
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Thr Gln Ala Asn Ala His Arg Phe Ile Ala Ala Leu Pro Glu Gly Tyr	
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Gln Arg Ile Ala Ile Ala Arg Ala Gly Lys Gln Arg Pro Ser Cys Cys	
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acc atc ccg acg ggt gct acg cgc gga tgc tgc agc tgc agc ggc	1245
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<211> 415

<212> PRT

<213> Sorghum bicolor

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<210> 6  
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Gly Ala Pro His Ala Asp Asp Asp Ala Gly Asp Glu Trp Ala Arg Pro	
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Glu Leu Glu Ala Phe His Leu Pro Ser Pro Ala His Gln Pro Pro Gly	
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Phe His Leu Ala Ala Gly His Gln Pro Glu Ala Ala Ala Glu Gln Pro	
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Gly Ala Ala Pro Pro Ser Pro Ser Pro Pro Pro Pro Pro Ala Pro Leu	
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Glu Met Asp Gln Pro Pro Asn Ala Lys Pro Ala Ser Ser Ser Ala Ala	
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Ala Ala Gly Ala Asn Asp Asn Lys Lys Pro Thr Pro Pro Ala Ala Leu	
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Met Ile Gly Arg Thr Thr Leu Val Ile Ala His Arg Met Ser Thr Ile	
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Phe	Val	Leu	Gln	Trp	Arg	Leu	Ala	Leu	Val	Leu	Leu	Ala	Val	Phe	Pro	
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Thr	Ile	Asp	Arg	Lys	Thr	Glu	Val	Glu	Pro	Asp	Asp	Val	Asp	Ala	Ala	
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Pro	Val	Pro	Glu	Arg	Pro	Lys	Gly	Glu	Val	Glu	Leu	Lys	His	Val	Asp	

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Cys Gly Lys Ser Ser Val Leu Ala Leu Val Gln Arg Phe Tyr Glu Pro			
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Arg Ala Gly Ser Gly Arg Thr Thr Ile Val Val Ala His Arg Leu Ala			
1315	1320	1325	
acg gtg cgc ggc gcg cac acc atc gcg gtc atc gac gac ggc aag gtg			4032
Thr Val Arg Gly Ala His Thr Ile Ala Val Ile Asp Asp Gly Lys Val			
1330	1335	1340	
gcg gag cag ggg tcg cac tcg cac ctg ctc aag cac cat ccc gac ggg			4080
Ala Glu Gln Gly Ser His Ser His Leu Leu Lys His His Pro Asp Gly			
1345	1350	1355	1360

tgc tac gcg cgg atg ctg cag ctg cag cgg ctg acg ggc ggg tgc cgc	4128
Cys Tyr Ala Arg Met Leu Gln Leu Gln Arg Leu Thr Gly Gly Cys Arg	
1365 1370 1375	
gcc cgg gcc gcc gcc gtc gtc gtc caa cgg ggc cgc cgc gta gga tgg	4176
Ala Arg Ala Ala Ala Val Val Val Gln Arg Gly Arg Arg Val Gly Trp	
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Met Asp Gly Ser Trp Met Ser Leu Val Pro	
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Gly Ala Pro His Ala Asp Asp Asp Ala Gly Asp Glu Trp Ala Arg Pro	
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Glu Leu Glu Ala Phe His Leu Pro Ser Pro Ala His Gln Pro Pro Gly	
35 40 45	
Phe His Leu Ala Ala Gly His Gln Pro Glu Ala Ala Ala Glu Gln Pro	
50 55 60	
Thr Thr Leu Pro Ala Ala Arg Arg Thr Ser Asp Thr Ser Thr Ala Ala	
65 70 75 80	
Gly Ala Ala Pro Pro Ser Pro Ser Pro Pro Pro Pro Ala Pro Leu	
85 90 95	
Glu Met Asp Gln Pro Pro Asn Ala Lys Pro Ala Ser Ser Ser Ala Ala	
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Ala Ala Gly Ala Asn Asp Asn Lys Lys Pro Thr Pro Pro Ala Ala Leu	
115 120 125	
Arg Asp Leu Phe Arg Phe Ala Asp Gly Leu Asp Cys Ala Leu Met Leu	
130 135 140	
Val Gly Thr Leu Gly Ala Leu Val His Gly Cys Ser Leu Pro Val Phe	
145 150 155 160	
Leu Arg Phe Phe Ala Asp Leu Val Asp Ser Phe Gly Ser His Ala Asn	
165 170 175	
Asp Pro Asp Thr Met Val Arg Leu Val Val Lys Tyr Ala Phe Tyr Phe	
180 185 190	
Leu Val Val Gly Ala Ala Ile Trp Ala Ser Ser Trp Ala Glu Ile Ser	

195					200					205					
Cys	Trp	Met	Trp	Thr	Gly	Glu	Arg	Gln	Ser	Thr	Arg	Met	Arg	Ile	Arg
210						215					220				
Tyr	Leu	Asp	Ala	Ala	Leu	Arg	Gln	Asp	Val	Ser	Phe	Phe	Asp	Thr	Asp
225					230					235					240
Val	Arg	Thr	Ser	Asp	Val	Ile	Tyr	Ala	Ile	Asn	Ala	Asp	Ala	Val	Val
				245					250					255	
Gly	Ala	Gly	Arg	His	Gln	Arg	Glu	Ala	Gly	Gln	Pro	His	Pro	Leu	His
			260					265					270		
Gly	His	Leu	Arg	Gly	Gly	Leu	Arg	Arg	Gly	Leu	His	Arg	Arg	Leu	Ala
		275					280					285			
Ala	Gly	Ala	Arg	His	Ala	Arg	Arg	Arg	Ala	Ala	His	Arg	Arg	His	Arg
	290					295					300				
Gly	Ala	Gln	Arg	Arg	Arg	Ala	Arg	Gln	Ala	Leu	Leu	Gln	Glu	Pro	Gly
305					310					315					320
Arg	Ala	Val	Gly	Arg	Gln	Arg	His	Arg	Gly	Ala	Gly	Ala	Arg	Ala	Asp
				325					330					335	
Thr	Asp	Arg	Ala	Gly	Leu	Arg	Arg	Arg	Gly	Ala	Arg	Asn	Ala	Gly	Val
			340					345					350		
Leu	Gly	Gly	Val	Gly	Arg	Arg	Ala	Glu	Asp	Arg	Leu	Pro	Gln	Arg	Leu
	355						360					365			
Arg	Gln	Gly	Ala	Arg	Pro	Arg	Arg	His	Leu	Leu	His	Arg	Leu	Leu	Leu
	370					375					380				
Leu	Arg	Pro	Pro	Ala	Leu	Val	Arg	Arg	Thr	Pro	Arg	Pro	Arg	Asn	His
385					390					395					400
Thr	Asn	Gly	Gly	Leu	Ala	Ile	Ala	Thr	Met	Phe	Ser	Val	Met	Ile	Gly
				405					410					415	
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		420						425					430		
Ala	Arg	Val	Ala	Ala	Ala	Lys	Ile	Phe	Arg	Ile	Ile	Asp	His	Arg	Pro
		435					440					445			
Gly	Ile	Ser	Ser	Arg	Asp	Gly	Glu	Asp	Gly	Gly	Gly	Val	Glu	Leu	Glu
	450					455					460				
Ser	Val	Thr	Gly	Arg	Val	Glu	Met	Arg	Gly	Val	Asp	Phe	Ala	Tyr	Pro
465					470					475					480
Ser	Arg	Pro	Asp	Val	Pro	Ile	Leu	Arg	Gly	Phe	Ser	Leu	Ser	Val	Pro
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Ala	Gly	Lys	Thr	Ile	Ala	Leu	Val	Gly	Ser	Ser	Gly	Ser	Gly	Lys	Ser



500					505					510						
Thr	Val	Val	Ser	Leu	Leu	Glu	Arg	Phe	Tyr	Asp	Pro	Ser	Ala	Gly	Gln	
515					520					525						
Ile	Leu	Leu	Asp	Gly	His	Asp	Leu	Lys	Ser	Leu	Lys	Leu	Arg	Trp	Leu	
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Arg	Gln	Gln	Ile	Gly	Leu	Val	Ser	Gln	Glu	Pro	Thr	Leu	Phe	Ala	Thr	
545					550					555					560	
Ser	Ile	Lys	Glu	Asn	Leu	Leu	Leu	Gly	Arg	Asp	Ser	Gln	Ser	Ala	Thr	
565					570					575						
Gln	Ala	Glu	Met	Glu	Glu	Ala	Ala	Arg	Val	Ala	Asn	Ala	His	Ser	Phe	
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Ile	Val	Lys	Leu	Pro	Asp	Gly	Tyr	Asp	Thr	Gln	Val	Gly	Glu	Arg	Gly	
595					600					605						
Leu	Gln	Leu	Ser	Gly	Gly	Gln	Lys	Gln	Arg	Ile	Ala	Ile	Ala	Arg	Ala	
610					615					620						
Met	Leu	Lys	Asn	Pro	Ala	Ile	Leu	Leu	Leu	Asp	Glu	Ala	Thr	Ser	Ala	
625					630					635					640	
Leu	Asp	Ser	Glu	Ser	Glu	Lys	Leu	Val	Gln	Glu	Ala	Leu	Asp	Arg	Phe	
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Met	Ile	Gly	Arg	Thr	Thr	Leu	Val	Ile	Ala	His	Arg	Met	Ser	Thr	Ile	
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Arg	Lys	Ala	Asp	Val	Val	Ala	Val	Leu	Gln	Gly	Gly	Pro	Val	Ser	Glu	
675					680					685						
Met	Gly	Ala	His	Asp	Glu	Leu	Met	Ala	Lys	Gly	Glu	Asn	Gly	Thr	Tyr	
690					695					700						
Ala	Lys	Phe	Ile	Arg	Met	Gln	Glu	Gln	Ala	His	Glu	Ala	Ala	Phe	Val	
705					710					715					720	
Asn	Ala	Arg	Arg	Ser	Ser	Ala	Arg	Pro	Ser	Ser	Ala	Arg	Asn	Ser	Val	
725					730					735						
Ser	Ser	Pro	Ile	Met	Thr	Arg	Asn	Ser	Ser	Tyr	Gly	Arg	Ser	Pro	Tyr	
740					745					750						
Ser	Arg	Arg	Leu	Ser	Asp	Phe	Ser	Thr	Ser	Asp	Phe	Thr	Leu	Ser	Ile	
755					760					765						
His	Asp	Pro	His	His	His	His	Arg	Thr	Met	Ala	Asp	Lys	Gln	Leu	Ala	
770					775					780						
Phe	Arg	Ala	Gly	Ala	Ser	Ser	Phe	Leu	Arg	Leu	Ala	Arg	Met	Asn	Ser	
785					790					795					800	
Pro	Glu	Trp	Ala	Tyr	Ala	Leu	Val	Gly	Ser	Leu	Gly	Ser	Met	Val	Cys	

				805				810				815			
Gly	Ser	Phe	Ser	Ala	Ile	Phe	Ala	Tyr	Ile	Leu	Ser	Ala	Val	Leu	Ser
			820				825						830		
Val	Tyr	Tyr	Ala	Pro	Asp	Pro	Arg	Tyr	Met	Lys	Arg	Glu	Ile	Ala	Lys
			835				840						845		
Tyr	Cys	Tyr	Leu	Leu	Ile	Gly	Met	Ser	Ser	Ala	Ala	Leu	Leu	Phe	Asn
			850				855						860		
Thr	Val	Gln	His	Val	Phe	Trp	Asp	Thr	Val	Gly	Glu	Asn	Leu	Thr	Lys
			865				870						880		
Arg	Val	Arg	Glu	Lys	Met	Phe	Ala	Ala	Val	Leu	Arg	Asn	Glu	Ile	Ala
			885				890						895		
Trp	Phe	Asp	Ala	Asp	Glu	Asn	Ala	Ser	Ala	Arg	Val	Ala	Ala	Arg	Leu
			900				905						910		
Ala	Leu	Asp	Ala	Gln	Asn	Val	Arg	Ser	Ala	Ile	Gly	Asp	Arg	Ile	Ser
			915				920						925		
Val	Ile	Val	Gln	Asn	Ser	Ala	Leu	Met	Leu	Val	Ala	Cys	Thr	Ala	Gly
			930				935						940		
Phe	Val	Leu	Gln	Trp	Arg	Leu	Ala	Leu	Val	Leu	Leu	Ala	Val	Phe	Pro
			945				950						960		
Leu	Val	Val	Ala	Ala	Thr	Val	Leu	Gln	Lys	Met	Phe	Met	Lys	Gly	Phe
			965				970						975		
Ser	Gly	Asp	Leu	Glu	Ala	Ala	His	Ala	Arg	Ala	Thr	Gln	Ile	Ala	Gly
			980				985						990		
Glu	Ala	Val	Ala	Asn	Leu	Arg	Thr	Val	Ala	Ala	Phe	Asn	Ala	Glu	Arg
			995				1000						1005		
Lys	Ile	Thr	Gly	Leu	Phe	Glu	Ala	Asn	Leu	Arg	Gly	Pro	Leu	Arg	Arg
			1010				1015						1020		
Cys	Phe	Trp	Lys	Gly	Gln	Ile	Ala	Gly	Ser	Gly	Tyr	Gly	Val	Ala	Gln
			1025				1030						1040		
Phe	Leu	Leu	Tyr	Ala	Ser	Tyr	Ala	Leu	Gly	Leu	Trp	Tyr	Ala	Ala	Trp
			1045				1050						1055		
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			1060				1065						1070		
Met	Val	Leu	Met	Val	Ser	Ala	Asn	Gly	Ala	Ala	Glu	Thr	Leu	Thr	Leu
			1075				1080						1085		
Ala	Pro	Asp	Phe	Val	Lys	Gly	Gly	Arg	Ala	Met	Arg	Ser	Val	Phe	Glu
			1090				1095						1100		
Thr	Ile	Asp	Arg	Lys	Thr	Glu	Val	Glu	Pro	Asp	Asp	Val	Asp	Ala	Ala

1105	1110	1115	1120
Pro Val Pro Glu Arg	Pro Lys Gly Glu Val	Glu Leu Lys His Val Asp	
1125	1130	1135	
Phe Ser Tyr Pro Ser Arg	Pro Asp Ile Gln Val	Phe Arg Asp Leu Ser	
1140	1145	1150	
Leu Arg Ala Arg Ala Gly	Lys Thr Leu Ala Leu Val	Gly Pro Ser Gly	
1155	1160	1165	
Cys Gly Lys Ser Ser Val	Leu Ala Leu Val	Gln Arg Phe Tyr Glu Pro	
1170	1175	1180	
Thr Ser Gly Arg Val Leu	Leu Asp Gly Lys Asp Val	Arg Lys Tyr Asn	
1185	1190	1195	1200
Leu Arg Ala Leu Arg Arg	Val Val Ala Val Ala	Pro Gln Glu Pro Phe	
1205	1210	1215	
Leu Phe Ala Ala Ser Ile	His Asp Asn Ile Ala Tyr	Gly Arg Glu Gly	
1220	1225	1230	
Ala Thr Glu Ala Glu Val	Val Glu Ala Ala Thr	Gln Ala Asn Ala His	
1235	1240	1245	
Arg Phe Ile Ala Ala Leu	Pro Glu Gly Tyr Gly Thr	Gln Val Gly Glu	
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Arg Gly Val Gln Leu Ser	Gly Gly Gln Arg Gln Arg	Ile Ala Ile Ala	
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Arg Ala Leu Val Lys Gln	Ala Ala Ile Val Leu Leu	Asp Glu Ala Thr	
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Ser Ala Leu Asp Ala Glu	Ser Glu Arg Cys Val Gln	Glu Ala Leu Glu	
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Thr Val Arg Gly Ala His	Thr Ile Ala Val Ile Asp	Asp Gly Lys Val	
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Ala Glu Gln Gly Ser His	Ser His Leu Leu Lys His	His Pro Asp Gly	
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Cys Tyr Ala Arg Met Leu	Gln Leu Gln Arg Leu Thr	Gly Gly Cys Arg	
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Ala Arg Ala Ala Ala Val	Val Val Gln Arg Gly Arg	Arg Val Gly Trp	
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Met Asp Gly Ser Trp Met	Ser Leu Val Pro		
1395	1400		